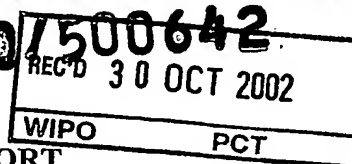


PATENT COOPERATION TREATY

PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)



Applicant's or agent's file reference SHW:MB:FP15636	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).	
International Application No.  PCT/AU02/00007	International Filing Date (day/month/year) 4 January 2002	Priority Date (day/month/year)  7 March 2001
International Patent Classification (IPC) or national classification and IPC  Int. Cl. <sup>7</sup> G08B 13/186		
Applicant  FUTURE FIBRE TECHNOLOGIES PTY LTD et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.  
☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 6 sheet(s).

3. This report contains indications relating to the following items:

- |      |                                     |   |
|------|-------------------------------------|---|
| I    | <input checked="" type="checkbox"/> | Basis of the report   |
| II   | <input type="checkbox"/>            | Priority  |
| III  | <input type="checkbox"/>            | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability  |
| IV   | <input type="checkbox"/>            | Lack of unity of invention  |
| V    | <input checked="" type="checkbox"/> | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| VI   | <input type="checkbox"/>            | Certain documents cited   |
| VII  | <input type="checkbox"/>            | Certain defects in the international application  |
| VIII | <input checked="" type="checkbox"/> | Certain observations on the international application   |

Date of submission of the demand 26 April 2002	Date of completion of the report 18 October 2002
Name and mailing address of the IPEA/AU  AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer   <b>GREG POWELL</b> Telephone No. (02) 6283 2308

**I. Basis of the report****1. With regard to the elements of the international application:\***

- ☐ the international application as originally filed.
- ☒ the description, pages 1-16, as originally filed,  
pages , filed with the demand,  
pages , received on with the letter of
- ☒ the claims, pages , as originally filed,  
pages , as amended (together with any statement) under Article 19,  
pages 17-20, filed with the demand,  
pages 21-22, received on 27 May 2002 with the letter of 27 May 2002
- ☒ the drawings, pages 1/2-2/2, as originally filed,  
pages , filed with the demand,  
pages , received on with the letter of
- ☐ the sequence listing part of the description:  
pages , as originally filed  
pages , filed with the demand  
pages , received on with the letter of

**2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.**

These elements were available or furnished to this Authority in the following language which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

**3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:**

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

**4. ☐ The amendments have resulted in the cancellation of:**

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/fig.

**5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\***

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Claims 1-14	YES
	Claims	NO
Inventive step (IS)	Claims 1-14	YES
	Claims	NO
Industrial applicability (IA)	Claims 1-14	YES
	Claims	NO

**2. Citations and explanations (Rule 70.7)**

None of the citations listed in the ISR discloses a below ground perimeter security system including the cable layout, wave guide configuration, the launching means and the detector means as claimed claims 1, 11 and 12. Claims 2-10, 13 and 14 appended to claims 1, 11 and 12 claim additional features. Hence the invention claimed in claims 1-14 is considered to be novel and inventive.

The closest art is found in JP 2000-048269 A and WO 00/37925 A.

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claims 1, 11 and 12 are not clear because 'zig-zag spaced apart relationship with respect to one another' in claim 1, lines 15-16 and claim 11, lines 16-17, and 'spaced apart relationship relative to one another' in claim 12, lines 8-9 do not clearly define the zig-zag overlapping layout shown in fig 2.

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Claims:

1. A perimeter security system including;  
at least a first waveguide and at least a second  
waveguide buried below ground level and extending along a  
perimeter which defines an area to be monitored;  
means for launching light into the first and  
second waveguides;  
a detector for detecting light which has  
propagated through the waveguides so as to detect a change  
in a parameter of the light propagating through the  
waveguides due to an intrusion across the ground beneath  
which the waveguides are buried and for providing an  
indication of that intrusion;  
the first and second waveguides being provided in  
separate cables and the separate cables being buried  
beneath ground level in zig-zag spaced apart relationship  
with respect to one another to define a perimeter region  
having a substantial width which will be traversed by a  
person intruding into the area;  
a first of the said cables contains said at least  
one waveguide and a second said cable contains said second  
waveguide;  
a further waveguide being contained within the  
first cable;  
first coupling means at one end of the said  
first, second and further waveguides for coupling the  
waveguides so that light launched into the said further  
waveguide is able to propagate through the further  
waveguide and then into the said first and said second  
waveguides to propagate in a first direction through the  
said first and second waveguides;  
second coupling means at the other end of said  
first and said second waveguides so that the light  
propagating in the said first direction through said first  
and second waveguides is able to coherently recombine and  
interfere at the second coupling means; and  
light also being able to be launched through said

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second coupling means and into said first and second waveguides to travel in a direction opposite said first direction and coherently recombine at the first coupling means so the light travelling in the opposite direction is able to interfere and then propagate through the said further waveguide.

2. The perimeter security system of claim 1 wherein the detector detects the interference pattern and upon an intrusion a parameter of light passing through one of the waveguides is altered with respect to the same parameter of the light passing through the other of the waveguides, to thereby change the interference pattern detected by the detector to provide an indication of the intrusion.

3. The perimeter security system of claim 1 wherein the substantial width is a width such that a person travelling in normal walking or running motion will not step over the width of the region.

4. The perimeter security system of claim 3 wherein the width of the region is between one and two meters.

5. The perimeter security system of claim 1 wherein counter-propagating light signals are launched into each of the waveguides so that the location of an intrusion can be detected by the time difference between detection of the changed interference pattern propagating in one direction and to the changed interference pattern propagating in the opposite direction.

6. The perimeter security system of claim 1 wherein the detector is coupled to the further waveguide and to the second coupling means for detecting the counter propagating light signals after interference of those signals so that any disturbance of the first waveguide and/or said second waveguide will change a parameter of

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the light propagating through the first and/or second waveguides to thereby change the interference patterns detected by the detector to cause the detector to provide an indication of the intrusion.

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7. The perimeter security system of claim 6 wherein the location of the intrusion can be determined by the time difference between receipt of the modified counter-propagating signal travelling in the first direction compared to the receipt of the modified propagating signal travelling in the opposite direction.

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8. The perimeter security system of claim 6 wherein the detector comprises a first detector and a second detector, the first detector and second detector being synchronised and the first detector detecting the counter-propagating signal travelling in the first direction and the second detector detecting the counter-propagating signal travelling in the opposite direction.

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9. The perimeter security system of claim 1 wherein the means for launching light into the waveguides comprises a light source coupled to a third coupling means having first and second output arms, the first output arm being coupled to an input arm of a fourth coupling means and the other output arm being coupled to an arm of a fifth coupling means, an arm of the fourth coupling means being coupled to the further waveguide for launching light into the further waveguide, and an arm of the fifth coupling means being coupled to an arm of the second coupling means for launching light into the second coupling means.

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10. The perimeter security system of claim 8 wherein the first detector is coupled to an output arm of the fourth coupling means and the second detector is connected to an output arm of the fifth coupling means.

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11. A perimeter security system for underground use including:

5 at least a first waveguide and at least a second waveguide for extending along a perimeter which defines an area to be monitored;

means for launching light into the first and second waveguides;

10 a detector for detecting light which has propagated through the waveguides so as to detect a change in parameter of the light propagating through the waveguides due to an intrusion across the ground when the waveguides are buried, and for providing an indication of that intrusion;

15 the first and second waveguides being provided in separate cables, and the separate cables being for location beneath ground level in a zig-zag spaced apart relationship with respect to one another to define a perimeter region having a substantial width which will be traversed by a person intruding into the area;

20 a first of said cables containing said at least one waveguide and a second said cable containing said second waveguide;

25 a further waveguide being contained within the first cable;

30 first coupling means at one end of said first, second and further waveguides for coupling the waveguides so that light launched into said further waveguide is able to propagate through the further waveguide, and then into the said first and said second waveguides to propagate in a first direction through the first and second waveguides;

35 second coupling means at the other end of said first and said second waveguides so that the light propagating in said first direction through said first and second waveguides is able to coherently recombine and interfere at the second coupling means; and

light also being able to be launched through said



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second coupling means and into said first and second waveguides to travel in a direction opposite said first direction, and coherently recombine at the first coupling means so that the light travelling in the opposite  
5 direction is able to interfere and then propagate through said further waveguide.

12. A below ground perimeter security system including:

10 a first cable containing at least one first waveguide;

a second cable containing at least one second waveguide;

15 the first and second cables being arranged below ground level and in spaced apart relationship relative to one another to define a barrier region which, should the region be traversed at ground level, will result in detection of the traversing of that barrier region;

20 means for launching light into the first and second waveguides, so that the light is able to either circulate through the first and second waveguides in counter propagating manner, or be reflected from respective ends of the first and second waveguides and propagate back along the respective first and second  
25 waveguides into which the light was launched;

means for receiving the light from the first and second waveguides so that the light can interfere; and

30 a detector for detecting the interfering light from the first and second waveguides to detect a change in a parameter of the light propagating through the first and second waveguides due to the traversing of the barrier region to provide an indication of an intrusion across the barrier region.

35 13. The system of claim 12, wherein the first and second waveguides are coupled together by a coupler so that the light circulates through the waveguides in

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counter propagating manner to enable not only the detection of intrusion, but also the location of the intrusion.

- 5 14. The system according to claim 12, wherein the first and second waveguides are each provided with a reflective end, and light is reflected from the reflective end back along the first and second waveguides.

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